We cannot conclude this account without referring to the magnetic work done at the observatory. Father Denza contributes to the third report a long discussion of the magnetic declination and inclination at Rome, and, by a comparison of observations, finds the secular variations. In the latter half of the seventeenth century, the declination was about two and one-half degrees West, and increasing. In 1806, Gili obtained a value of 17° 17', and in 1824 a maximum of 18° seems to have been reached. The declination then began to decrease, and its value at the end of 1891 was 10° 45'·35. The first observation of the magnetic inclination at the Vatican was made in 1891. This element had been previously determined, however, in other parts of Italy by several observers. From 1859, when Secchi observed the inclination at the Roman College, up to the present time, the recorded values for various parts of Italy have been fairly numerous. Before 1859, however, very few observations were made. In 1640 an observer gave 65° 40' as the inclination at Rome, and Humboldt obtained a value of 61° 57' in 1806. Father Denza gives 58° 4'·6 as the inclination at the Vatican Observatory in 1891. A number of other matters are discussed in the volumes under notice, and many observations are included, upon which we have not been able to comment in this article. Enough has been said, however, to show that the observatory has furthered investigations in many branches of physical science, and, from the energetic character of the workers, we may confidently expect many more contributions to scientific knowledge.

R. A. GREGORY.

NOTES.

The Bakerian lecture is to be delivered before the Royal Society by Prof. T. E. Thorpe, on the 22nd inst., the subject of the lecture being a research carried out by Mr. J. W. Rodger and himself on the relations between the viscosity (internal friction) of liquids and their chemical nature.

We are requested to state that Mrs. Tyndall would be much indebted to any correspondents of the late Prof. Tyndall who have preserved his letters, if they would kindly lend them to her for use in the preparation of his biography. Any letters thus lent should be sent to her at Hind Head House, Haslemere, and would be returned safely to their owners.

A hygienic laboratory has been established in the University of Bonn. The new institution will be under the direction of Prof. Finkler. According to the *British Medical Journal*, there is now no university in Prussia without a hygienic laboratory. From the same authority we learn that the Bengal branch of the Pasteur Institute was successfully inaugurated on January 30, in the presence of a large company.

The Duke of York visited King's Lynn on Friday, and opened a new technical school built by the Corporation at a cost of £3,000.

The order of S.S. Maurice and Lazarus has been conferred upon Sir Joseph Lister, M. Pasteur, and Prof. Virchow, by the King of Italy.

Mr. Henry O. Forbes has been selected by the Library Committee of the Liverpool Corporation for appointment as Director of the Liverpool Museums.

The late Dr. J. K. Hasskarl, whose death we announced on January 25, has, says the *Chemist and Druggist*, bequeathed his library to the University of Strassburg, and his herbarium to the University of Leyden.

Prof. Billroth died at Abbazia, on February 6, at sixty-five years of age. He principally devoted his attention to military surgery, and published a number of valuable papers on that branch of his profession. It is said that during the last few months of his life he was engaged in completing a work upon the physiology of music.

We regret to announce the death of Mr. Peter Redpath, a generous benefactor to science in Canada. Mr. Redpath took an active interest in the McGill College and University, Montreal, and in 1880 built, at his sole expense, a museum in connection with the University. This building, known as the Peter Redpath Museum, is used for the exhibition and study of specimens in geology, mineralogy, palaeontology, zoology, botany, and archæology. In October last, a library, capable of holding 130,000 volumes, and added to the University buildings through the liberality of Mr. Redpath, was opened in the presence of a large and influential gathering. The sums spent in erecting the museum and library are said to amount to nearly £75,000. Mr. Redpath died at Chislehurst on February 1, in his seventy-third year.

Prof. Edmond Frémy died on Saturday, at Paris. We are indebted to the *Times* for the chief points in the following sketch of his career. The son of a professor of chemistry at St. Cyr, he was born at Versailles on February 28, 1814, and after studying with his father, became a teacher at the École Polytechnique. In 1857 he was elected into the Paris Academy of Sciences as successor of Baron Thénard. The amount of Frémy's scientific work is enormous. His first publications date from 1835; they relate to the precious metals, and attracted the attention of the scientific world. His investigations on ozone (in conjunction with Becquerel), on the ammoniacal bases of chrome and cobalt, on fluor spar and the reproduction of minerals, will remain classical. In organic chemistry, also, he made numerous important researches, and as manager of the Saint Cobain Works he superintended the manufacture of soda and sulphuric acid, the tempering of glass and steel, the refining of castings, &c. Not long ago he published, jointly with one of his pupils, M. Verneuil, a work, which was the fruit of years of study, on the artificial production of rubies. He was the author, with Pelouze, of a treatise on chemistry in six volumes, and in 1881 began the publication of a chemical encyclopædia.

In addition to the names we gave last week, the *Lancet* says that the following are some of the principal delegates who have been appointed to represent the various Governments at the International Sanitary Conference which opened in Paris yesterday. Great Britain: Mr. Constantine Phipps and Dr. Thorne Thorne, C.B., F.R.S. British India: Surgeon-General Cuningham. France: M. Barrère, M. Hanotaux, Prof. Brouardel, Prof. Proust, and M. Monod. Germany: Herr von Schoen and Herr Mordtmann. Holland: Dr. Ruysch and M. de Stuers. Russia: M. Michel de Giers, together with technical delegates. Austria-Hungary: Count Kuefstein, Dr. Hagel, and Dr. Karliuski. Greece: M. Criésis and M. Vafiades. Italy: the Marquis de Malaspina and Dr. Pagliani. Portugal: M. Navarro. Sweden and Norway: M. Due. Turkey: Tuskan Bey, Nouri Pasha, Boukowski Pasha, and Dr. Haindy Bey. Persia: A delegate yet to be appointed by the Persian Ministry in Paris. Egypt: Achmet Pasha Choukry, M. Mieville, and Sedky Pasha. The remaining countries—Belgium, Denmark, and Spain—have not yet announced their delegates.

The Executive Committee of the City and Guilds of London Institute have changed the name of the Guilds Central Institution, in Exhibition Road, South Kensington, to the Guilds Central Technical College.

The gold medal of the Royal Astronomical Society has been awarded to Mr. S. W. Burnham for his discoveries of binary stars and researches in connection with them. At the annual general meeting of the society, to be held to-morrow, the proposal will be made that henceforth the meetings be held at

4.30 p.m. instead of 8 p.m. At present the Royal Society is the only one that meets at 4.30 at Burlington House.

THE fourteenth general meeting of the Federated Institution of Mining Engineers will be held at Leeds on February 14, and a number of important papers will then be read. Arrangements have been made for visits to works, &c. on the following day.

As an introduction to the summer excursions of the London Geological Field Class, Prof. H. G. Seeley, F.R.S., will deliver a course of four lectures on "The Shaping of the Earth," at Wortley Hall, Seven Sisters Road, beginning on February 22.

WE learn from the *Kew Bulletin* that Mr. W. Lunt has been appointed botanical collector for Kew to Mr. Theodore Bent's expedition to the Hadramant Valley, in South Arabia. The flora is only conjecturally known, and no botanical collections appear ever to have been made in it. The expedition left London on November 24, and is expected to return about April.

THE number of the *Kew Bulletin* for December, 1893, contains an important correspondence between the Colonial Office and the Directors of the Royal Gardens, Kew, on the root-disease of the sugar-cane; and an interesting account, by two of the gardening staff at Kew, of the subtropical horticulture in various gardens in Cornwall.

THE *Botanical Gazette* says that Mr. O. F. Cook sailed on October 25 for Western Africa, to make further observations and collections of the plants of that region, especially of cryptogams. He will be gone a year or more. His former voyage resulted in securing a large amount of botanical material, and the present visit is expected to yield even greater results.

AT the monthly meeting of the Malacological Society of London on January 12, Mr. G. B. Sowerby described a new species of the genus *Verticordia*, to which he gave the name of *V. optima*. The shell, which far exceeds in size and beauty any hitherto known, was taken off Port Blair, at a depth of 188 fathoms. The description and figure will appear in the forthcoming number of the *Proceedings* of the Malacological Society of London.

THE vertical distribution of the British Lepidoptera forms the subject of an article by Mr. W. H. Bath in the January and February numbers of the *Entomologist*. Too little attention is usually given to this interesting branch of entomology, though as a matter of fact vertical distribution is as important as horizontal or geographical distribution, for, as Mr. Bath points out, it not only estimates the affinities existing between the lowland species occurring in this country, and their relations in more elevated areas in the South of Europe, but shows the relationships between our mountain forms and their representatives found at higher altitudes in Alpine regions, and lower in Arctic and sub-Arctic latitudes. And further, vertical distribution gives a better index as to the range of temperature and other climatic phenomena which each species can endure than mere geographical distribution is capable of doing in anything like the same area. Mr. Bath has prepared a list of vertical zones in the British Isles, taking as its basis the divisions defined by the Brothers Speyer in their work on the distribution of Swiss and German Lepidoptera. His proposed list contains five zones, viz. the South Coast zone, the Lower Hill zone, the Upper Hill zone, the Lower Alpine zone, and the Upper Alpine zone. The limitations of these zones are fully described, besides being presented in a tabular form, so that any entomologist who desires to take up this mountaineering branch of his science will find that Mr. Bath has considerably smoothed the way of observation.

THE *Geographical Journal* for February contains a note of a journey up the Cross River, made by Sir Claude Macdonald, the Commissioner for the Niger Coast Protectorate. Since 1842 no vessel larger than a canoe had gone up the river as far as the rapids, but the stern-wheeler *Beecroft*, navigated by Captain Dundas, met with no difficulty, and in her Sir Claude passed the rapids, and would have gone on to some high falls spoken of by natives, but the rainy reason was almost over, and the river beginning to fall so rapidly that he had to return. The natives met with were friendly and anxious to have regular communication on the river.

WE have received a pamphlet from Mr. Robert Stein, setting forth his plan for the exploration of Ellesmere Land in a concise and practical form. His expedition is undertaken with the cordial approval of the National Geographic Society of Washington and of many of the leading British and American Arctic explorers. Mr. Stein retains full liberty for his conduct of the expedition, but is aided in organising it by an advisory committee consisting of Commodore G. W. Melville, Dr. T. C. Mendenhall, General Greely, and Mr. John Joy Edson, who acts as treasurer. The expedition is estimated to cost only 10,000 dollars, a large part of it being subscribed by the members already appointed, while the remainder was nearly made by private subscriptions. The proposed method of working bears every mark of having been carefully thought out. Twenty-two men at most will take part in it, and they will leave St. John's, Newfoundland, about May 1, 1894, in a whaler, which will land them at Cape Tennyson, in Ellesmere Land, or as near that point as possible. A house will be erected, provisioned for two years, and left in charge of four men. Eight men will follow the coast of Ellesmere Land westward, and establish an advanced depot about 100 miles from the base, and then make an attempt to reach Hayes Sound. A thorough search will be made eastward along the coast by a party of six for the missing Swedish naturalists Bjorling and Kalstennius. The whole party intended to spend the winter of 1894 at the base, where continuous meteorological observations will be carried on, and in the spring of 1895 they will endeavour to extend the exploration as far as Greely fjord, but will make their way by the end of September to Cape Warrender, on Lancaster Sound, where four men will be left at a depot in 1894 to await them. A whaler will meet them there by appointment, and bring the expedition back to Scotland or Newfoundland. Careful scientific observations will be made throughout, and collections in all departments of natural history are arranged for. Over sixty men had volunteered for the expedition up to January 9; of these, thirty were found to be suitable, but only three had been definitely engaged. The estimate of 10,000 dollars provides only for a party of ten; in order to establish the reserve station at Cape Warrender, and to search properly for the lost Swedes, a further sum must be raised. Should the first expedition prove successful, Mr. Stein's larger scheme of Arctic exploration will probably be proceeded with on his return.

IN the *Geological Magazine* for February, Miss M. M. Ogilvie continues her paper on "Coral in the 'Dolomites' of South Tyrol." The article is illustrated by a fine map and sections of the district discussed. Miss Ogilvie's conclusion with regard to coral formations in the dolomites strengthens "the position of those authorities who have contended that the immense thicknesses of 'Schlern Dolomite' rock were an ordinary marine deposit and not 'coral-reefs.'"

THE discovery of petroleum on the Mendip Hills has recently been announced. A well at Ashwick Court, two miles north of Shepton Mallet, has long been known to yield water slightly flavoured at times with petroleum. A considerable flow of oil is said to have taken place in July, 1892, when the water-level was low, and this has continued at intervals, but in smaller quantities, since that date. Ashwick is shown on the Geological Survey map to stand at the northern edge of the carboniferous limestone; the beds have a high dip to the north, passing under the millstone grit and the coal-measures of the Radstock area. Indications of petroleum are also known in other wells and springs in the neighbourhood. The matter is now being investigated by Mr. Boverton Redwood and Mr. W. Topley, under whose directions further explorations will be made.

THE phosphatic marls of New Jersey have long been known; they have been worked for fertilisers since 1768. Mr. W. Bullock Clark has published a paper "On the Cretaceous and Tertiary Formations of New Jersey." (Ann. Rep. of the State Geologist, 1892.) The origin of a glauconitic greensand is fully discussed, and reference made to recent deep-sea research. Coloured reproductions are given of Murray and Renard's plates in the *Challenger* Expedition Report, exhibiting phases in the formation of glauconite. The greensands occur most commonly near the boundary lines between the shallow and deep-water zones, but not opposite the mouths of large rivers, nor where strong currents prevail. In making the detailed survey in New Jersey, a small boring apparatus has been used, which seems, from the description given, to be simpler and more portable than that employed on the Belgian and English surveys. It is made of half-inch gas-piping, in lengths of 10 feet. This gives good results to a depth of 30 feet.

MR. CLARK'S paper is further illustrated by prints from photographs. Some of those, *e.g.* "View among the Navesink Highlands," suggest nothing so much as an ultra-"impressionist" daub, all blur and no colour! The professional photographer complains of the hypercritical eye of his fair sex constituency; one could wish that nature had a word to say for herself. The photographic camera is fast coming to be considered part of the equipment of the geologist. If men, whose movements in the field are already well burdened by hammer, compass, knapsack, and specimens, are willing to add to those the inconvenience of a camera, there must be great advantage to be got from photography. But what advantage will be derived from an occasional lucky hit? It would be difficult to name the science now that does not utilise photography. Clearly the time has come when another "optional" may be added to the subjects of the complete curriculum. At any rate, science must recognise photography at its professional value, and must refuse bad photographs and worse prints.

FOR some time past the United States Hydrographic Office has been collecting information about the meteorology of the North Pacific Ocean, with the intention of utilising it for the benefit of seamen, and it has recently issued an advance Pilot Chart of that ocean for the month of January, 1894, on the same principle as the Pilot Chart for the North Atlantic Ocean, which has often been referred to in our columns. The hydrographer states that, if Congress grants the necessary funds, it is proposed to issue on the first day of each month a chart showing for the succeeding month, by deduction from accumulated observations, the winds and currents to be expected, the regions of prevailing fog and rain, the most advantageous routes to be followed by sail and by steam, &c. The amount of information available for the Pacific is greatly inferior to that for the Atlantic, but if the support and cooperation sought for are freely given by those interested in enhancing the safety of navigation, the undertaking will undoubtedly become a very valuable contribution to maritime meteorology.

M. H. PARENTY has been investigating the forms of steam jets from various orifices, and has published his results in the last number of the *Comptes Rendus*. The diagrams accompanying the paper, in which regions of different pressures are shaded differently, exhibit some curious fluctuations, which may be described as a series of nodes and ventral segments proceeding outwards from the orifice. These fluctuations are due to the interference between the outgoing waves of steam pressure and those reflected back by the air. In the case of a convergent elliptical orifice of 13°, three nodes were found with pressures of 115, 165 and 138 c.m. respectively, that at the orifice being 285 c.m. or 3·75 atmospheres. All the nodes occurred within 2 c.m. of the orifice. They were found by means of an air-manometer provided with very finely-drawn glass tubes. It appears that the position and value of the nodes or condensations depend upon the difference of pressure between the boiler and the atmosphere, and the form of the orifice. At very high pressures the jet assumes an approximately paraboloidal shape, such as would be assumed by a liquid jet falling upon a disc of the size of the orifice. A further conclusion reached by M. Parenty is that the highest attainable velocity of efflux is the limiting velocity of sound in the medium concerned.

THE curious polarisation phenomena obtained with very small electrodes in a sulphuric acid voltameter through which a strong current passes, accounts of which have appeared in *Wiedemann's Annalen* for the winter of 1892, suggested to Dr. L. Arons the question as to what would take place at a very thin and small metallic partition in a voltameter. Some preliminary observations made by Dr. Arons showed that when a piece of gold-leaf was pasted over a hole 15 mm. in diameter bored through a glass partition in a voltameter, there was no visible development of gas at the partition; while with platinum foil ·02 mm. thick there was a profuse development of gas with the same current strength. A very thorough investigation of the polarisation phenomena upon thin metal partitions has been carried out by Mr. John Daniel, an account of which is published in the *Philosophical Magazine* for February. The author has examined partitions made of gold, platinum, silver, and aluminium, and finds that, in good conducting solutions of sulphuric acid, copper sulphate, and common salt, the critical thickness, below which there is no polarisation, is for gold between ·00009 mm. and ·0004 mm., while for plates more than ·004 mm. thick the polarisation is as great as for very thick plates. The author finds that the polarisation of "thick" plates is about the same for all currents between 0·2 ampere and 0·01 ampere, provided time be allowed in each case for the current to become constant. With "thin" plates, however, the polarisation depends upon the current. By thick plates we mean those with a thickness greater than 0·004 mm., and by thin plates those having a thickness less than this quantity.

THE same number of the *Philosophical Magazine* contains a paper by Mr. W. H. Steele, on the thermoelectric diagram for some pure metals. From some thermoelectric observations he had made, the author was led to suspect that the lines given by Prof. Tait in his thermoelectric diagram were not quite accurate, and he has therefore undertaken the measurements necessary to construct a diagram, using metals in as great a state of purity as possible. The metals used are aluminium, tin, lead, zinc, thallium, silver, gold, copper, cadmium, and antimony. The electromotive force for a temperature difference of about 100° C. was in each case compared with that of a standard Clark cell made according to Lord Rayleigh's instructions.

THE distribution of zymotic disease by sewer air is a question still *sub judice*, and in order to throw, if possible, some additional light on the subject the London County Council asked Mr. Laws to make some investigations on the air in some of the London sewers. The report has recently been presented and published. The principal experiments were made in a sewer running under the Green Park, and constructed some 120 years ago, and presumably having had ample opportunity for getting thoroughly contaminated. The percentage of carbonic acid gas present was estimated, and especial attention was given to the microbial contents of sewer air. For the detection of the latter Prof. Percy Frankland's method (*Phil. Trans.* 1887) was employed, and it is to be regretted that as this process enables large volumes of air to be sifted for micro-organisms in a short time, Mr. Laws did not examine more than ten litres. The results recorded confirm those obtained by previous observers, *i.e.* that sewer air contains generally very few organisms, and, as a rule, less than the air outside. Dr. Petri's observations on sewer air are not mentioned, but they are worth quoting, for he examined 100 litres of air in a Berlin sewer, and found on one occasion no organisms at all; and in another experiment only one bacterium and three moulds. It would appear, therefore, that drain air as regards freedom from microbes is very frequently superior to that which we inhale in our houses, and compares especially favourably in this respect with the air in crowded reception-rooms. Mr. Laws, however, concludes his report by remarking that although the organisms in sewer air do not probably constitute any source of danger, the latter may contain some highly poisonous chemical substance which may produce a profound effect upon the general vitality. But everyone agrees that sewer air is not a desirable addition to the atmosphere either of our streets or houses.

THE *Midland Naturalist* has ceased publication, owing to lack of support, after sixteen years' existence.

AMONG the papers in the *Actes de la Société Scientifique du Chili*, vol. iii. 1893, is one on the Coleoptera of Chili, by M. P. Germain, and another containing a description of a new method of determining the orbits of planets and comets, by M. A. Obrecht.

THE *University Correspondence College Calendar* (1893-4) has just been published. It contains answers to the questions set at the Matriculation Examination of last month, and articles on the special subjects for June, 1894, and January and June, 1895.

MR. R. H. SCOTT, F.R.S., has prepared an abridgment of his "Elementary Meteorology," in the form of a little book containing five hundred questions and answers on meteorology. The book, which is published by Messrs. Williams and Strahan, will be found useful to teachers and others.

ANOTHER of the Alembic Club Reprints (No. 5) has been published by Mr. W. F. Clay, Edinburgh. The volume contains extracts from the *Micrographia* of Hooke (1665), and a specially interesting paper in which his views on combustion are explained.

MESSRS. NALDER BROS. AND CO., Red Lion-street, Clerkenwell, have issued a price list of electrical testing, mathematical, optical, and other scientific instruments manufactured by them. The catalogue is very well illustrated, and each article named in it is given a telegraphic code word, so that in ordering any piece of apparatus it is simply necessary to transmit to the makers the code word allotted to it.

THREE representatives of the Lancashire County Council Technical Instruction Committee visited, last year, some of the chief continental schools which give technical instruction in horology, the silk industry, and mining. As a result of the inquiry a report has just been issued, in which the deputation recommends the establishment of schools in which all these subjects are thoroughly taught.

THE *Quarterly Journal of the Geological Society* (No. 197) contains, in addition to eight papers, eight plates illustrating the work of Mr. Rutley on the "Sequence of Perlitic and Spherulitic Structure," of Mr. E. A. Walford on "Inferior Oolite Bryozoa from Shipton Gorge, Dorset," and "Cheilostomatous Bryozoa from the Middle Lias," and of Dr. J. W. Evans on the "Geology of Matto Grosso, Brazil."

AN entirely new edition (the seventeenth) of "Johnston's Elements of Agricultural Chemistry" has been published by Messrs. W. Blackwood and Sons. Prof. C. M. Aikman has revised the whole of this well-known text-book, rewritten large portions of it, and added new matter, so as to bring the work up to the present position of agricultural chemistry. The fact that the book has survived unto the seventeenth edition is sufficient evidence of its usefulness.

A SERIES of coloured botanical diagrams, suited for class teaching, has been published by the Society for Promoting Christian Knowledge. The plants selected are chiefly indigenous, and the leaf, blossom, parts of the blossom, husk, and seed of each are very clearly shown in a greatly enlarged form. The diagrams thus exhibit to students the characteristic parts of plants, and will doubtless facilitate the study of some common specimens.

"A TEXT-BOOK of Solid or Descriptive Geometry," by Mr. A. B. Dobbie (Blackie and Son), is a little book possessing many good points, and one upon which great pains have evidently been spent. There are about 350 diagrams in the book, all of which have been carefully designed by the author. The diagrams and explanatory text are both extremely clear, and the problems well arranged. Elementary courses in plane geometry and graphic arithmetic are included, and add to the value of a book which we confidently recommend to the notice of teachers.

THE first part of the volume of the Proceedings of the Congrés International de Zoologie, held at Moscow during August, 1892, was reviewed in NATURE of January 5, 1893. The second part has just been published, and is of equal excellence with the one that preceded it. The volume contains thirty memoirs, occupying 287 pages altogether, and a supplement of 83 pages is devoted to the second report of Prof. Blanchard on the nomenclature of organisms. Prof. Blanchard presented his first report upon this subject to the International Zoological Congress that met at Paris in 1889.

THE first edition of "Electricity in the Service of Man" (Cassell and Co.) was published in 1888. Two years later a second edition appeared, and the third is now before us. The work has been revised and enlarged by Dr. R. M. Walmsley, and it has certainly benefited by his changes. Some 120 pages of the second edition have been excised, and new matter covering more than 200 pages has been inserted. It would be tedious to enumerate the numerous additions that have been made, both in the theoretical and technical sections of the subject. Suffice it to say that Dr. Walmsley has brought the book well up to date, and has largely increased its value by a thorough revision.

THE *Irish Naturalist* for February contains a list of all the known additions to the flora of the north-east of Ireland (except Musci and Hepaticæ) since the publication in 1888 of Stewart and Corry's work upon that subject. The list also embodies additional localities for many of the rarer species. Dr. Scharff concludes a paper on the Irish wood-lice, in which he gives descriptions of all the British species. Miss S. M. Thompson sets up a plea for Irish glaciology, and the Rev. Hilderis Friend describes a new Irish earthworm.

AN admirable review of the rapid progress which has been made during the last few years in the new domain of stereochemistry, which deals with the spacial arrangement of the atoms which compose a chemical molecule, is contributed to the *Chemiker Zeitung* by Prof. Victor Meyer. The literature of this most interesting branch of chemical study has so rapidly accumulated since the theory of Le Bel and Van't Hoff was promulgated in the year 1874, that a concise account of the important stages of progress which have led up to the present state of our knowledge is particularly welcome. The earlier portion of the memoir is devoted to the development of the idea of the asymmetric carbon atom, and the growth of the conviction that the occurrence of isomeric compounds represented by the same constitutional formula—which differ only in their action upon polarised light, and very slightly in other physical properties, such, for instance, as the three lactic acids—could only be accounted for by the different spacial arrangement of the atoms in the molecule. The fundamental assumptions of Van't Hoff are very clearly expressed, and the possibilities of isomerism by change in the relative positions of the various groups attached at the four corners of the hypothetical carbon tetrahedron are fully illustrated. A striking example is afforded in this connection by one of the results of the brilliant researches of Emil Fischer in the sugar group, whereby we are made acquainted with no less than thirteen distinct sugars, all of which are represented by the same constitutional formulæ $CH_2OH.(CHOH)_4.CH_2OH$. The second section is devoted to the stereo-isomerism of the derivatives of ethylene, so ably worked out by Wislicenus. The simple explanation of the remarkable and long-discussed case of the isomeric acids, maleic and fumaric, upon the lines of the new theory, is referred to, and a similar explanation extended to numerous other and more complicated of the derivatives of ethylene. The third section deals with the peculiar nature of the stereo-isomerism of closed-chain compounds, such as the polymerised tri-aldehydes. It is then shown in a further section that carbon is by no means peculiar in lending itself to stereo-isomerism, but that the pentavalent nitrogen atom is likewise capable of furnishing isomers which differ structurally merely in the relative positions occupied by the five attached atoms or groups. The stereo-isomerism of nitrogen compounds is shown, however, to be largely influenced by the weight and complexity of the five attached groups. The interesting discovery of a second di-oxim of benzil by Goldschmidt in Prof. Meyer's laboratory, gave a great impulse to the study of nitrogen compounds containing the group $C = N$, termed oxims, and the number of stereo-isomeric oxims which have subsequently been isolated bear remarkable testimony to the use of a theory in stimulating research.

THE additions to the Zoological Society's Gardens during the past week include two Swainson's Lorikeets (*Trichoglossus novæ-hollandiæ*) from Australia, presented by Mr. John Biehl; a Chilian Conure (*Conurus smaragdinus*) from Chili, presented by Mrs. Gibney; two Eyed Lizards (*Lacerta ocellata*) twenty European Tree Frogs (*Hyla arborea*) South European, presented by Mr. T. Keen; a Madagascar Porphyrio (*Porphyrio madagascariensis*) from Madagascar, a Waxwing (*Ampelis garrulus*), two Long-tailed Tits (*Parus caudatus*) European, purchased; a Hog Deer (*Cervus porcinus*) born in the Gardens

OUR ASTRONOMICAL COLUMN.

ECLIPSE METEOROLOGY.—A very extensive series of meteorological observations was made during the total eclipse of the sun on January 1, 1889, at Willows, California. It appears that the temperature fell 6° F. from the commencement of totality to ten minutes after, while the variation of the barometer was so nearly identical with the daily fluctuation that no effect could with certainty be ascribed to the eclipse. The influence on the wind, however, was very marked, its previous velocity of twelve miles per hour being reduced almost to that of a calm. Observations with the solar radiation thermometer showed that some heat was received throughout totality. An attempt was also made to secure concerted observations of the so-called "shadow bands"—the long dark bands separated by white spaces which are seen in rapid motion on the ground and sides of buildings just before and after totality. The observations collected seem to give decisive evidence against the view that the bands are diffraction fringes in the shadow of the moon, the observed velocities being far less than that of the shadow; the fact that they were prominently seen at some stations, while at others they were hardly visible, indicates a local origin (*Ann. Harvard. Coll. Obs.* vol. xxix.).

In the same volume, Mr. Parkhurst gives an account of his photometric observations of some of the asteroids, and confirms the previous conclusion that there is a phase correction over and above that for the defect of illuminated surface, and that this correction is different for different asteroids; the idea that large errors may be introduced by rotation, however, is not confirmed. The same writer also gives the individual observations of a large number of variable stars, which furnish valuable data for the construction of light-curves.

A REMARKABLE COMETARY COLLISION.—Two striking photographs are reproduced in the February number of *Knowledge*, in illustration of an article, by Prof. E. E. Barnard, on the probable encounter of Brooks' Comet with a disturbing medium on October 21, 1893. The comet was discovered by Mr. Brooks, on October 16, but though it was kept under observation at the Lick Observatory, no phenomena of an extraordinary kind were observed until the 21st of that month. A photograph, then taken with a Willard photographic lens, presented a remarkable appearance, the tail appearing, to use Prof. Barnard's analogy, like a torch streaming in the wind. The reproductions of the photographs give the impression that the comet's tail swept into some dense medium, and was broken up by the encounter. Indeed, Prof. Barnard thinks it impossible to escape the conclusion that the tail did actually enter a disturbing medium which shattered it. This theory is supported by the photograph taken on October 22, where the tail is seen to hang in irregular cloudy masses, and a large fragment appears to be entirely separated from the main part. There is little doubt that the tail met a mass of meteoritic matter, and so had its symmetry destroyed; at any rate, this supposition must be accepted until a simpler and better one can supplant it. What we have to do, as Mr. Cowper Ranyard remarks in an article on the irregularities of comets' tails, is diligently to collect facts. The multiplication of such photographs as those obtained of Brooks' Comet, and of Swift's Comet (1892), by Prof. Barnard, will certainly revolutionise current opinion as to the development, and the types, of comets' tails.

MIRA CETI.—According to the *Companion to the Observatory*, this famous variable star will reach a maximum about the 17th inst. At the time of writing (February 3), the star is of a reddish tinge, and faintly visible to the naked eye; but, unfortunately, it is too near the sun to permit of long-continued observations on the same evening. The magnitude at maximum is very inconstant, and varies between 1·7 and 5·0 (Gore). Spectroscopic observations of the star are of the highest importance, and it is to be hoped that a satisfactory record of its phases will be secured. The general spectrum is one of Group II., but near a former maximum, Pickering photographed a number of bright lines, chiefly of hydrogen. Among the points on which information is desirable are: (1) at what phase of the variation the bright lines of hydrogen make their appearance; (2) the fluctuations in the bright flutings of carbon observed by Mr. Lockyer at the maximum of 1888 (NATURE, vol. xxxviii. p. 621).

PROPER MOTIONS OF STARS. — The recently published volume (xxv.) of the *Annals* of the Harvard College Observatory contains values for the proper motions of a large number of stars in the zone 50°—55° north, the adopted values, however, being only at present regarded as provisional. The results are derived by Prof. Rogers from the comparison of his own positions for the stars in this zone, obtained with the meridian circle, with the positions given for corresponding stars by earlier catalogues. One section of the volume gives the values of α and δ, referred to the system of the *Astronomische Gesellschaft*, for the stars included in the zone in question.

THE SYSTEM OF ALGOL —An elaborate discussion of the inequalities in the period of Algol recently led Mr. Chandler to